



Goddard Space Flight Center 2009 Sample Student Projects

Required Academic Level

Graduate/Masters,
Graduate/Doctorate

Category

Space Science

Subcategory

Heliophysics

Project Title

Analysis of Solar Flare Observations

Project Description

The student will use existing and on-going observations of solar flares made from space and from the ground in a variety of wavelengths to understand the physical processes involved in these high-energy phenomena. In particular, the RHESSI X-ray imaging spectroscopy data for many flares observed since launch in Feb. 2002 will be used. The objective will be to determine the total energy in plasma heated to >10 MK for each flare. The student will use existing computer programs written in IDL to generate and analyze the X-ray images and spectra obtained during each flare. Automating these procedures will be a goal to allow the thousands of flares to be analyzed efficiently. For specific flares, other observations will be examined to augment the RHESSI results. These will include observations in X-rays from Hinode, MESSENGER, and CORONAS; in gamma-rays from Fermi; in EUV/UV from SOHO, TRACE, Hinode and STEREO; and in H-alpha from various ground-based observatories.

Mentor's Expectation of Student

The student will be expected to master the execution of existing IDL programs through the user-friendly GUI to generate X-ray images and spectra from the RHESSI data. Comparison of the results with observations at other wavelengths will be carried out to determine the total energy in the thermal plasma generated during each flare. Detailed results will be expected on the total energy in >10 MK plasma for several well-observed flares.

Discipline of Project and/or Background Needed to successfully complete the project

Astronomy; Astrophysics; Databases; Image Processing

Skills

IDL